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BULLETIN 103

AUGUST, 1896.

Ontario Agricultural College and Experimental Farm

EXPERIMENTS

WITH

WINTER WHEAT

By C. A. ZAVITZ, B.S.A., EXPERIMENTALIST.

PUBLISHED BY

THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.

TORONTO:
WARWICK BRO'S & RUTTER, GOVERNMENT PRINTERS
1896.

THE ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM, GUELPH, ONT.

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BULLETIN 103.

EXPERIMENTS WITH WINTER WHEAT.

By C. A. ZAVITZ, B.S.A., EXPERIMENTALIST.

One hundred and thirty-three varieties of winter wheat have been tested at the Ontario Agricultural College within the last seven years. Of this number, fifty-three varieties have been grown for five years, and the remainder have been tested from one to four years. Besides testing the varieties, there have been experiments conducted in different dates of seeding, methods of seeding, selection of grain for seed, quantities of seed per acre, application of fertilizers, sowing of spring grain to act as a mulch for winter wheat, the yield and quality of wheat cut at different stages of maturity, and the value of seed from wheat cut at different stages of maturity. These different experiments have occupied eight hundred and eighty-five plots. This bulletin gives a summary report of the principal experiments conducted under these heads in 1896, and the average results of some of the experiments conducted for several years in succession.

CONDITIONS OF SOIL.

The field in which the grain was sown in 1896 is a good average clay loam, quite uniform in character, and has a very gentle slope towards the south-west. No manure nor commercial fertilizers had been applied to the land since the spring of 1893, when twenty tons per acre of farm-yard manure were used. The land produced a crop of corn in 1893, a crop of grain in 1894, and a crop for green manuring in 1895, which was plowed under in July of that year. No other plowing was done, but the land was well cultivated up to the first of September. The plots were made of uniform size for the different experiments, each containing one one-hundredth of an acre.

CONDITIONS OF SEASON AND GROWTH.

The seeding for all the experiments took place in the month of September. The germination was quite satisfactory throughout, and the growth of the wheats in the autumn was good. On examination of the crop in the following April, it was found that many of the varieties showed but little signs of winter killing, while others had been considerably frozen out, thus affording ample data for a comparison of the different plots in respect to hardiness.

Several thousand farmers visited our winter wheat plots in the month of June, and appeared to be much interested in the comparative growth shown by the different experiments.

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VARIETIES TESTED.

Eighty-one varieties of winter wheat have been under test this season. The plots were situated side by side, the soil being quite uniform throughout. They were separated from each other by paths three feet wide. All the plots were sown by hand, at the rate of two bushels per acre, on September 4th, with the exception of eight varieties, which were sown on small sized plots, about ten days later, and which are not included in the tabulated results. The varieties ripened between the 10th and the 18th of July, which was about six days earlier than in 1895. The trouble from smut this season was very slight. The yields per acre have been calculated from the actual yields of the plots.

The following table gives the number of varieties tested and reported on within the past seven years, and also the average yields for each of these years:

Year.	Number of varieties grown each year.	Average weight of grain per measured bushel.	Average yield of—	
			Straw per acre.	Grain per acre.
1890.....	15	60.0	2.4	30.9
1891.....	23	63.3	2.0	52.9
1892.....	44	60.5	3.2	49.6
1893.....	52	58.4	2.1	29.9
1894.....	80	60.8	4.0	46.7
1895.....	102	60.4	1.2	26.1
1896.....	81	60.3	2.6	42.1

From this table it will be observed that the eighty-one varieties tested in 1896, gave an average of 2.6 tons of straw, and 42.1 bushels of grain per acre, and an average weight of grain per measured bushel of 60.3 pounds. The yield of grain, therefore, is about four and a half bushels per acre more than the average yield of the past seven years. The average weight per measured bushel, however, is one-fifth of a pound less than the average of these years. The largest yield of grain per acre was obtained in 1891, and the smallest in 1895. It will be observed that there is a great difference in the quality of grain produced in the several years. The average weight per measured bushel in 1891 was 63.3 pounds, and in 1893 58.4 pounds. For some of the reasons of these variations, reference can be made to the six bulletins on winter wheat, previously issued. From a careful study of the above table and the previous winter wheat bulletins, the reader will readily understand that it is of great importance to have these experiments extend over a period of several years, in order to have the varieties subjected to various climatic conditions. We wish to emphasize the fact that the average results of three, four or five years' experimental work should be of much greater value than the results obtained from experiments of only one year.

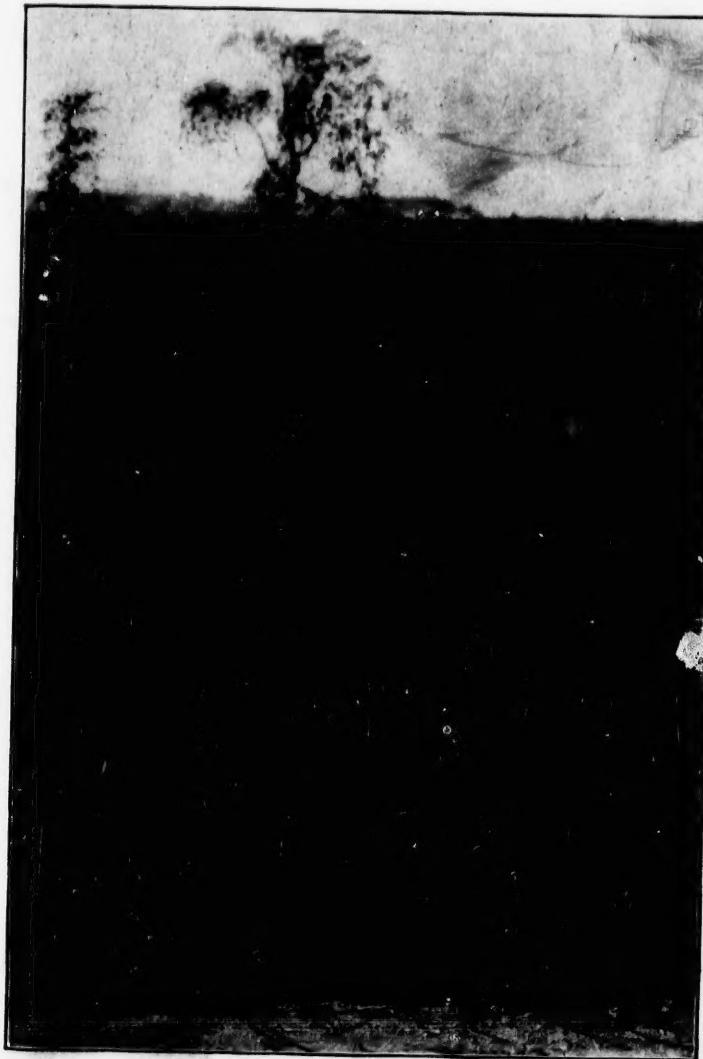
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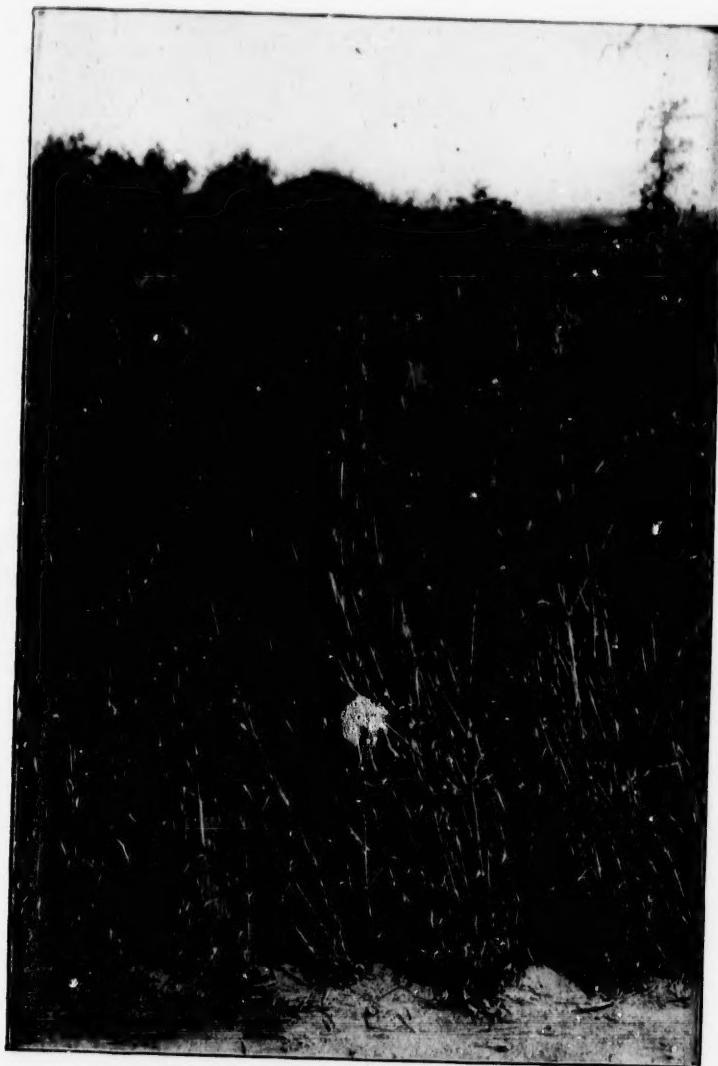
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CHARACTERISTICS AND YIELDS OF VARIETIES.

The following table contains the characteristics and the yields of seventy-four varieties tested during the past season. The horizontal rows give information regarding the different varieties, and the perpendicular columns furnish a means of comparing the characteristics and the yields of the varieties with one another. Starting at the left hand side of the table, columns 1 and 2 give the numbers and names of the varieties, and indicate the numbers of years reported upon; 3 and 4 refer to their characteristics; 5, 6 and 7 give results for 1896; and 8, 9, 10, 11, 12, 13 and 14 give average results for five, four, three or two years, or for one year, as indicated in columns Nos. 1 and 2.

The first twenty-five varieties mentioned in the table include those which have given the most satisfactory results in the trials of six and seven years, as well as the results of the varieties which were grown for the first time in 1892. In order to make a better comparison of these varieties, the average results of only the last five years are here presented.

The reader's attention is especially directed to the last column on the right hand side of the table, as this gives the average yield of grain per acre of each variety for the number of years reported upon, and the varieties are arranged in the table according to their average yields, starting with the highest, and finishing with the lowest.

One of the principal advantages of giving the results of so many varieties as are here recorded, is to enable any farmer to compare the varieties which are new to him with those he has been familiar with for several years.

New Varieties not Included in Table. Seven new varieties were sown ten days later than the others, and on plots exactly one-half the size. As the conditions of the experiment were not the same as for the rest of the varieties, these are not included in the present table. The following list gives the names of these varieties, and the yield of each in bushels of grain per acre: Johnson, 36.8; Bearded White Fife, 32.2; Eastman, 37.2; Gold Coin, 31.1; Roberts, 27.8; French Hero, 25.7, and White Golden Cross, 19.3.

Varieties Discarded after Four, Five, or Six Years' Tests. In our bulletin of 1895, it was mentioned that fifty-three varieties had been tested for four, five, or six years in succession. Of this number twenty-five of the best varieties have again been grown in 1896, and twenty-eight of the less satisfactory kinds have been dropped from our experiments. The following list gives the names of the varieties which we have discarded: Kessingland Red, Galizien Summer, Dividend, White Patanelle, Regent, Square Head, Browick Red, Spalding Red, Red Inversible, Saumur, Red Russian, Fulcaster, Red Wonder, Rumsey, Rogers, Rutherford, Lancaster, New Monarch, Hybrid Mediterranean, Garfield, Canadian Velvet Chaff, Martin Amber, Red Lion, Seneca or Clawson, White Pearl, Democrat, Walker's Reliable and Manchester.

CHARACTERISTICS AND YIELDS OF 74 VARIETIES OF WINTER WHEAT.

VARIETIES.	Heads, Bearded or Bald.	Color of Grain.	Results for 1896.				Average results for number of years reported upon.					
			Per cent. of rust.	Weight of grain per measured bushel.	Yield of grain per acre (bu. 60 lb.)	Date of maturity.	Height of crop 0=standing 2=lodged.	Percent. of straw lodged.	Weight of 1,000 kernels.	Straw. per mea- sured bush.	Yield per acre— Grain (bu. 60 lb.)	
Grown for five years.												
1. Dawson's Golden Chaff.	Ba	W	40 0=free.	lbs.	bush.	July.	ins.	0=	21	59.8	2.9	49.9
2. Egyptian	Br	W	25	61.0	53.6	20	46.7	29	18	60.7	3.0	46.8
3. Golden Drop.	Br	R	30	62.6	57.6	19	44.1	47	21	61.5	3.2	46.5
4. Early Red Clawson.	Br	R	50	59.9	48.9	19	44.3	45	23	58.7	3.1	46.2
5. Reliable.	Br	R	15	62.4	58.4	19	45.7	14	19	61.7	2.9	45.3
6. Russian Amber I.	Br	R	20	63.6	60.4	20	44.5	19	19	61.6	2.8	44.0
7. American Bronze.	Br	R	70	59.9	46.3	21	46.8	2	20	59.3	3.0	42.8
8. Bulgarian.	Bw	W	40	60.3	45.5	21	47.4	18	20	61.1	2.6	42.1
9. Red Velvet Chaff.	Ba	R	45	60.8	46.8	20	47.6	35	17	58.4	3.3	41.5
10. Golden Cross or Volunteer.	Br	R	50	59.2	39.4	22	46.9	22	21	60.1	3.0	40.4
11. Standard.	Ba	W	45	59.4	35.1	21	44.5	16	16	58.6	2.7	39.4
12. Surprise.	Ba	W	45	57.1	24.6	20	45.3	25	18	58.3	2.7	39.3
13. Bonnell or Landreth.	Ba	W	40	59.4	36.5	21	47.5	26	20	58.8	2.9	39.3
14. Jones' Winter Fife.	Ba	R	40	57.8	27.1	20	46.3	22	18	59.2	2.4	38.4
15. Longberry Red.	Br	R	20	63.4	55.7	20	43.9	42	24	61.0	2.7	37.4
16. Scott.	Ba	R	23	61.4	51.9	21	44.6	15	20	60.4	1.8	37.3
17. Valley.	Ba	R	50	62.4	46.3	19	43.9	10	18	61.0	2.4	37.1
18. Mediterranean.	Ba	R	55	59.8	39.8	20	44.0	31	22	60.4	2.9	36.9
19. Monette.	Ba	R	25	60.9	44.0	20	43.9	17	20	59.6	2.4	36.5
20. Genesee.	Ba	W	33	61.4	43.0	20	46.6	19	21	60.4	2.4	35.9
21. Velvet Chaff.	Ba	R	35	63.8	41.7	18	41.3	5	21	62.8	2.2	34.9
22. Fultz.	Ba	R	45	62.4	38.2	18	40.9	5	18	62.4	2.1	34.9
23. Deitz Longberry.	Ba	R	45	61.3	42.9	20	45.1	24	23	61.7	2.3	34.6
24. Manilla.	Ba	W	60	55.5	23.2	21	44.4	14	20	57.5	2.4	33.5
25. Hybrid Delhi.	Ba	W	55	59.4	22.2	21	44.2	20	20	59.4	2.1	32.1
Grown for four years.												
26. Stewart's Champion.	Ba	R	45	58.6	32.0	19	48.4	6	18	58.6	2.8	37.2
27. Early White Leader.	Ba	W	70	53.9	20.4	20	45.1	5	19	56.5	2.0	33.8
28. Sonies.	Ba	W	60	58.9	24.3	17	45.6	7	17	57.4	2.3	33.7
29. White Star.	Ba	R	70	58.9	29.2	18	45.8	6	23	59.8	2.0	32.8
30. Treadwell.	Ba	W	85	60.8	41.2	19	46.9	6	21	59.5	2.0	26.2
Grown for three years.												
31. Early Genesee Giant.	Ba	W	70	60.6	49.9	18	46.3	5	22	60.9	2.9	47.8
32. Imperial Amber.	Ba	R	15	61.1	66.4	17	45.5	37	20	59.7	3.6	46.3
33. Tasmania Red.	Ba	R	35	61.6	54.8	16	41.7	47	20	61.8	3.1	45.7
34. Early Ripe.	Ba	R	45	61.6	52.1	17	44.5	18	20	61.7	3.0	45.0
35. Egyptian Amber.	Ba	R	15	62.9	55.5	16	44.2	27	18	61.7	3.1	43.9
36. Poole.	Ba	R	35	61.8	59.7	17	42.3	15	21	61.0	2.7	43.8
37. New Columbia.	Ba	R	45	60.6	58.7	16	43.9	5	20	59.2	2.7	41.7
38. Siberian.	Ba	R	35	61.9	38.7	19	43.9	19	19	62.3	2.8	41.6

VARIETIES

Arranged according to the last column of this table, which gives the average yield of grain per acre for the number of years grown.

Grown for

39. Pride of
40. Red M.
41. Geneva
42. Arnold's
43. Bissell.
44. Emporia
45. Rudy
46. Tuscan
47. Zimmer
48. McPherson
49. Golden
50. Andrew
51. Simcoe
52. Turkish
53. Kentucky
54. Jones' S.
55. Penquitt
56. Currell
57. Hindostan
58. Bullard's

Grown for

59. Giant Squash
60. Michigan
61. Hunter's
62. Pride of
63. White Bear
64. German
65. Silver Star
66. Kalina
67. Amherst
68. Nonpareil
69. Mealy
70. Long Am.

Grown for

71. Queen M.
72. Bailey
73. Beattie's
74. Murray's

CHARACTERISTICS AND YIELDS OF 74 VARIETIES OF WINTER WHEAT.—*Concluded.*

Yield per acre— Straw. bush.	Grain (bu. 60 lb.)	VARIETIES.— <i>Concluded.</i>										Average results for number of years reported upon.		
		Heads, Barded or Bald.	Color of Grain.	Results for 1896.			Per cent. of rust.	Weight of grain per bushel.	Yield of grain per acre (bu. 60 lbs.)	Height of crop. ins.	Percent of straw lodged.	Weight per acre bush.		
Grown for three years.—<i>Concluded.</i>														
2.9	49.9	39. Pride of Genesee	B	R	30	62.3	43.8	16	44.8	22	22	61.6	2.6	41.0
3.0	46.8	40. Red May	B	R	25	61.9	52.4	15	44.4	13	19	63.3	2.7	40.4
3.2	46.5	41. Geneva	B	R	25	62.6	50.7	15	42.3	33	19	62.5	3.0	40.3
3.1	46.2	42. Arnold's Hybrid	B	R	35	62.8	46.0	15	48.5	12	18	61.7	2.7	39.8
2.9	45.3	43. Bissell	B	R	20	62.4	57.5	15	41.5	34	21	61.5	2.7	39.3
2.8	44.0	44. Emporium	B	R	10	60.7	48.9	19	46.9	20	18	59.3	2.9	39.2
3.0	42.8	45. Rudy	B	R	50	61.1	54.3	14	43.2	34	28	60.7	2.4	39.0
2.6	42.1	46. Tuscan Island	B	R	65	61.1	50.1	16	44.6	30	23	60.2	2.6	38.4
3.3	41.5	47. Zimmerman	B	R	25	61.1	42.4	16	41.7	6	17	61.6	2.3	37.8
3.0	40.4	48. McPherson	B	R	30	61.4	38.4	15	42.5	26	20	61.6	2.7	37.3
2.7	39.4	49. Golden Tankard	B	R	55	60.9	52.3	15	45.4	38	21	60.5	3.4	36.6
2.7	39.3	50. Andrew's No. 4	B	R	60	59.5	48.6	20	46.6	17	21	60.0	2.9	36.0
2.9	39.3	51. Simcoe Red	B	R	35	60.1	41.5	15	45.8	26	16	69.2	2.8	35.8
2.4	38.4	52. Turkish Red	B	R	15	61.5	26.0	15	38.4	42	18	62.0	2.2	34.8
2.7	37.4	53. Kentucky Giant	B	R	35	60.1	40.1	18	44.8	32	23	59.3	2.5	34.6
1.8	37.3	54. Jones' Square Head	B	W	50	57.4	22.9	17	43.9	4	20	58.5	2.1	33.8
2.4	37.1	55. Penquit's Velvet Chaff	B	R	70	60.3	35.9	16	42.3	12	19	61.4	2.8	32.6
2.9	36.9	56. Currell	B	R	50	60.6	37.9	16	43.3	18	19	61.0	2.6	31.8
2.4	36.5	57. Hindostan	B	R	85	60.1	38.1	19	44.1	29	28	60.7	2.4	31.5
2.2	34.9	58. Bullard's Velvet Chaff	B	R	70	60.0	39.8	20	43.9	2	19	60.5	1.8	25.0
Grown for two years.														
50. Giant Square Head	B	W	75	60.6	59.0	18	43.5	1	22	60.4	2.6	46.2		
60. Michigan Amber	B	R	40	61.2	57.0	16	41.5	8	19	61.5	2.7	46.2		
61. Hunter's Wheat	B	R	25	62.7	57.8	17	38.5	8	19	61.8	2.2	40.1		
62. Pride of Illinois	B	R	50	63.0	52.4	14	38.3	15	21	61.6	2.1	37.0		
63. White Bearded	B	W	45	60.1	38.8	17	37.6	2	20	59.5	1.8	35.3		
64. German Emperor	B	R	30	62.1	42.1	17	39.0	90	21	61.0	2.5	33.1		
65. Silver Star	B	W	65	60.8	38.2	19	40.8	5	22	61.2	1.7	30.5		
66. Kaline	B	R	60	60.2	38.1	18	40.3	5	24	60.2	1.7	27.9		
67. Amherst Isle	B	R	10	59.8	29.3	17	30.5	43	19	59.9	1.8	27.2		
68. Nonpareil	B	W	40	61.5	46.4	18	40.3	1	22	60.4	1.5	26.9		
69. Mealy	B	R	60	61.7	40.2	16	37.8	4	20	61.1	1.4	26.2		
70. Long Amber	B	W	70	58.7	19.3	21	37.0	18	20	66.4	1.1	19.1		
Grown for one year.														
71. Queen Meg	B	W	55	61.1	56.7	14	50.3	0	23	61.1	3.4	56.7		
72. Bailey	B	W	55	58.4	40.6	12	42.5	5	19	58.4	2.4	40.6		
73. Beattie's Victor	B	W	60	59.6	34.8	14	47.8	1	19	59.6	2.2	34.8		
74. Murray's Hybrid	B	W	35	59.4	33.9	12	45.3	15	21	59.4	2.4	33.9		

OBSERVATIONS ON THE VARIETY TESTS.

1. The numbers of bearded and of bald varieties of winter wheat which have been grown in our trial grounds are about equal.
2. In each of the seven years past, the bearded varieties have given a heavier weight per measured bushel than the bald varieties, the average being 1.2 pounds in favor of the bearded.
3. In yield of grain per acre for the past seven years, the bald varieties have given an average of 38.8 bushels, and the bearded varieties 38.2 bushels. In 1896, however, the bearded varieties gave about five bushels per acre more than the bald; and in 1891 the bald varieties surpassed the bearded by nearly ten bushels per acre.
4. Of all the winter wheats tested in 1896, fifty-four were red grained and twenty-seven were white grained varieties.
5. In six of the past seven years, the red wheats have given a heavier average weight per measured bushel than the white wheats by about one pound.
6. In 1896 the red wheats gave an average of exactly ten bushels per acre more than the white wheats; but in 1891 and 1894, the white wheats gave considerably larger yields than the red varieties, the average for the seven years being about equal.
7. In 1896, the varieties with bald heads and white grain gave only two-thirds as much in average yield of grain per acre, as the varieties with bearded heads and red grain.
8. The varieties which produced the least amount of rust in 1896 are, Reliable, Turkish Red, Egyptian Amber, Imperial Amber, Emporium, and Amherst Isle; and the variety most subject to rust was Hindostan.
9. The varieties which gave the heaviest weight per measured bushel in 1896 are, Velvet Chaff, Russian Amber, Longberry Red, Pride of Illinois and Egyptian Amber.
10. The varieties which gave the largest yield of grain per acre in 1896 are, Imperial Amber, Russian Amber, Poole, Giant Square Head, Hunter's Wheat and New Columbia.
11. The varieties which were first in reaching maturity in 1896 are Fultz, Turkish Red, Egyptian Amber, McPherson, Arnold's Hybrid, Imperial Amber, Geneva, Red May and Tuscan Island.
12. The varieties which produced the longest straw in 1896 are, Andrew's No. 4, Giant Square Head, Emporium, Golden Tankard, Simcoe Red and Imperial Amber.
13. The varieties which produced the longest average heads in 1896 are Long Amber, Manilla, Pride of Genesee, Stewart's Champion and Silver Star; and those which produced the shortest average heads are Queen Meg, Giant Square Head and Early Genesee Giant.
14. On examination of the yields per acre of eighty-one varieties of winter wheat tested in 1896, it is found that the ten varieties possessing the shortest heads produced an average of eleven bushels per acre more than the ten varieties possessing the longest heads.

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15. The varieties which produced the largest grains, or kernels, in 1896 are Rudy, Longberry Red, Deitz Longberry, Early Red Clawson, Kentucky Giant and Tuscan Island.

16. Dawson's Golden Chaff, Egyptian Amber, Imperial Amber, Poole and Giant Square Head varieties all came through the winter exceptionally well, and made a fine appearance in the spring of 1896.

EXPERIMENTS IN THE METHODS OF WINTER WHEAT GROWING.

The following concise reports are made upon the different wheat experiments conducted in the same portion of the experimental grounds that was used for the variety test. Some of these experiments extend over a period of three, and some over a period of four years.

Different Dates of Seeding. Two or more varieties of winter wheat have been sown at three different dates, in the month of September, in each of the past four years, and at four different dates in 1896.

The following table gives the average results for each date of seeding in 1896, and also for four years in which these experiments have been conducted :

Dates of seeding.	General appearance of plot in 1896.	Height of crop in 1896.	Straw per acre.		Weight per measured bushel.		Yield of grain per acre.	
			1896.	Average 4 years.	1896.	Average 4 years.	1896.	Average 4 years.
Sept. 2-3	Good	ins.	tons.	tons.	lbs.	lbs.	bush.	bush.
Sept. 7-9	Good	51	3.4	2.8	61.2	58.7	61.9	39.3
Sept. 17-20	Medium	50	3.3	2.8	60.9	58.7	58.4	38.1
Sept. 26	Poor	45	2.5	1.9	59.0	56.9	44.9	30.1
		41	1.7	57.1	27.3

It will be observed from the foregoing table that, in 1896, the best yield of both grain and straw per acre, and the heaviest weight of grain per measured bushel, were produced from the first seeding, which took place on the 3rd of September. The seeding of September 26th produced less than that of September 3rd by 34.6 bushels of grain and 1.7 tons of straw per acre, and by 4.1 pounds of grain per measured bushel. In the average results for four years, it will be seen that there is an average result of over 9 bushels of grain per acre, and a weight of nearly 2 pounds per measured bushel in favor of the seedlings on September 2nd and 3rd, as compared with those of September 17th and 20th.

Methods of Seeding. An experiment in sowing winter wheat broadcast, and with a grain drill, has been conducted in duplicate in each of the past three years. The average results from sowing the same qualities of grain by the two methods are very similar, there being a very slight advantage in favor of the drilled crop in both yield of grain and straw per acre, and in weight per measured bushel.

Different Quantities of Seed per Acre. In 1894, 1895 and 1896, two varieties of winter wheat were sown broadcast on small plots, at the rates of 1, $1\frac{1}{2}$ and 2 bushels per acre. The best yields of both grain and straw were obtained from the thickest seeding, and the smallest yields from the thinnest seeding, in each of the three years. It must be remembered that this experiment was conducted on small plots.

For wheat growers to determine the proper quantity of winter wheat to sow per acre in order to get the best results upon their respective farms, it will be advisable for them to observe and experiment for themselves, as so much depends upon the fertility of the soil and other conditions.

The Yield and Quantity of Winter Wheat as Affected by Cutting at Different Stages of Maturity. Five plots each, of the Dawson's Golden Chaff and the Early Genesee Giant winter wheats were sown on the same date in 1893, 1894, and again in 1895. These two varieties reached the stage of maturity at which winter wheat is usually cut in Ontario, on the 19th of July, 1894, the 18th of July, 1895, and the 11th of July, 1896. The two wheats were cut at five different periods during the three years, commencing on July 4th in 1894 and in 1895, and on June 30th in 1896. The periods between the cuttings were one week in length. In each of the three years the greatest yield of straw was obtained from the first cutting, and the heaviest weight of grain per measured bushel from the second and third cuttings. The yield of grain per acre was best from the last cutting in 1894 and in 1896, and from the second last cutting in 1895. The lowest results in yield of grain per acre and in weight of grain per measured bushel were obtained from the first cutting of each variety in each year. The quality of the straw in 1896 was decidedly the best from the first two cuttings, and was decidedly the poorest from the last two cuttings.

Value of Grain for Seed as affected by cutting at different stages of maturity. Dawson's Golden Chaff and the Early Genesee Giant varieties of winter wheat, were both sown on the same date in 1893 and again in 1894; and the plots were cut on July 4th, 11th, 18th, 19th and 25th, and August 2nd in 1894 and in 1895. The first cutting took place about two weeks before and the last cutting about two weeks after that stage of ripeness at which winter wheat is usually cut. A quantity of seed of each variety was taken both years from each of the five different cuttings, and these equal amounts of grain were sown upon a smaller number of uniform plots in the autumn of 1894 and 1895. The plots of the one year were all harvested at one time in July, 1895, and of the other year in July, 1896. It was found in the results of each year that the largest yield of grain per acre was produced by the seed of the last cutting of the previous year.

CO-OPERATIVE EXPERIMENTS WITH WINTER WHEAT.

Seventeen varieties of winter wheat which have been the most successful among all the varieties tested in the Experimental Department of the College, have been distributed over Ontario within the past four years. These have been sent out in sets of five varieties each. Eight thousand one hundred and fifty-five packets of winter wheat have been distributed during the past four years, and comparative tests have been made upon seventeen hundred Ontario farms. This system of co-operative experimental work was established by the ex-students of the Agricultural College; but, through repeated requests from other farmers, an invitation is extended to all interested persons to join in the work. The results have, on the whole, been very gratifying; and the numerous experimenters have become much interested in the different experiments undertaken. For detailed reports of these co-operative experiments, the reader is referred to the

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Annual Report of the Ontario Agricultural and Experimental Union which is printed along with the report of the Ontario Agricultural College. From among fourteen conclusions given in the report of last year regarding these co-operative experiments with winter wheat for 1895, the following five conclusions are quoted as being of interest in connection with the results given in this bulletin:

1. "In average yield of winter wheat per acre, Dawson's Golden Chaff stood highest among eleven varieties tested over Ontario in 1893, nine varieties in 1894 and nine varieties in 1895.
2. "In the co-operative experiments for 1895 Dawson's Golden Chaff, Jones' Winter Fife and the Early Genesee Giant give the best yields on heavy soils; and Dawson's Golden Chaff, the Early Genesee Giant and the American Bronze on light soils.
3. "Early Genesee Giant and Dawson's Golden Chaff made the best general appearance in the spring of 1895.
4. "American Bronze, Early Genesee Giant and Dawson's Golden Chaff possessed the stiffest straw in 1895.
5. "The Dawson's Golden Chaff was the most popular with the experimenters in each of the past three years; and during the present season it was chosen by over sixty per cent. of the farmers who sent in full reports as being the best among the varieties tested."

CONCLUSIONS.

1. The average results of winter wheat growing on the experimental plots for seven years in succession are as follows: Weight of grain per measured bushel, 60.5 pounds; yield of straw per acre, 2.5 tons; and yield of grain per acre, 38.7 bushels.
2. Dawson's Golden Chaff has given the largest average yield of grain per acre among fifty-three varieties of winter wheat grown at the Ontario Agricultural College for five years; also among eleven leading varieties tested over Ontario in 1893, nine varieties in 1894, and nine varieties in 1895.
3. The Early Genesee Giant has given the largest average yield of grain per acre among twenty-eight new varieties which were tested for the first time in 1894, and have now been tested for three years in succession. This variety also stood second in average yield per acre among nine leading varieties of winter wheat tested over Ontario in 1894, and nine leading varieties tested over Ontario in 1895.
4. The Early Genesee Giant, Giant Square Head, and Queen Meg varieties of winter wheat, which head the lists in average yield per acre among the varieties grown for three years, for two years, and for one year, respectively, are very similar in all characteristics.
5. Among eighty-one varieties of winter wheat tested in 1896, the Dawson's Golden Chaff, American Bronze, New Columbia, Early Genesee Giant, Giant Square Head, and Queen Meg produced the stiffest straw.
6. In the average of four years' experiments in seeding winter wheat on different dates, it is found that when the wheat was sown later than September 9th, the crop was much poorer than when the seeding took place on or before that date.

7. In the average results from growing winter wheat for seven years in succession, it is observed that the white grained varieties have given the largest yields per acre in those seasons when there was but little rust, and the red grained varieties in those seasons in which the rust was abundant.

8. The varieties which have given the best average results in the experiments at the College are the varieties which have also given the best satisfaction throughout Ontario.

DISTRIBUTION OF SEED FOR TESTING PURPOSES.

In the following table will be found three sets of winter wheat varieties, which will be sent free by mail, in half-pound lots of each variety, to farmers applying for them, who will carefully test the three kinds in the set which they choose and report the results after harvest next year. The sets will be sent out in the order in which they are received, as long as the supply lasts.

THREE SETS OF WINTER WHEAT FOR CO-OPERATIVE TESTS.

Set 1.	Set 2.	Set 3.
Dawson's Golden Chaff. Early Genesee Giant. Early Red Clawson.	Dawson's Golden Chaff. Pride of Genesee. Poole.	Dawson's Golden Chaff. Stewart's Champion. Siberian.

Each person wishing one of these sets should write to the Experimentalist, Agricultural College, Guelph, mentioning which set he wishes, and the grain, with instructions for testing and blank forms on which to report, will be forwarded free of cost to his address, until the supply of grain for distribution is exhausted.